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SCIENTIFIC MANAGEMENT OF THE REPAIRABLE ITEM INVENTORY SYSTEM.(U)
AUG 79 S NAHMIAS
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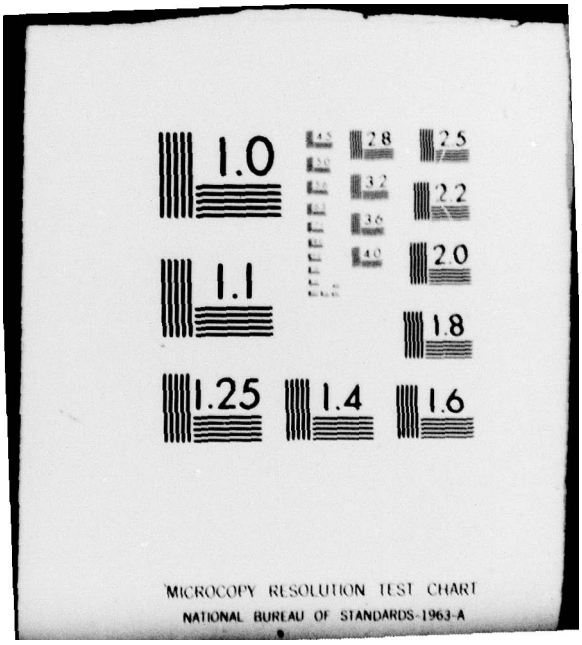
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

During the period one investigator was supported and conducted research under this grant. The purpose of this research was to examine a number of existing mathematical models of repairable inventory systems in order to discover possible improvements and/or generalization of existing work in this area of research. The research resulted in two research reports. One deals with a deterministic model for a repairable item iventory system with a finite repair rate. The second report deals with managing repairable item inventory systems. The second paper presents a relatively comprehensive review of the mathematical

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20. Abstract continued.

models which have appeared in the literature for managing inventory systems where items were subject ot repair. It deals with both the continuous review models - METRIC and its extensions - and periodic review models which are based on dynamic programming formulations.

University of Pittsburgh

SCHOOL OF ENGINEERING
Department of Industrial Engineering, Systems Management Engineering and Operations Research

August 28, 1979

Scientific Management of the Repairable Item Inventory System

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Air Force Office of Scientific Research
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Washington, D.C. 20000

FINAL REPORT OF GRANT AFOSR - 78 - 3494

The purpose of this research was to examine a number of existing mathematical models of reparable item inventory systems in order to discover possible improvements and/or generalizations of existing work. The research resulted in two papers plus a considerable effort on a problem for which no satisfactory results were obtained. Copies of the papers will be sent under separate cover.

1. "A Deterministic Model For a Reparable Item Inventory System With a Finite Repair Rate" with H. Rivera. To appear in The International Journal of Production Research.

This paper treats an inventory system in which the decision variables are respectively the number of units which are to be repaired and procured from the outside. It is an extension of a model developed by Schrady in that we treat the rate of repair as being finite rather than infinite as he does. Formulas are derived for the optimal repair and procurement batch sizes.

2. "Managing Reparable Item Inventory Systems: A Review". Currently under review for a special TSMS issue on multi-echelon inventory systems edited by L. Schwarz.

This paper presents a relatively comprehensive review of the mathematical models which have appeared in the literature for managing inventory systems where items are subject to repair. It deals with both the continuous review models (METRIC and its extension) and periodic review models which are based on dynamic programming formulations. Approximately fifty references are included.

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A. D. BLOSE
Technical Information Officer

3. A Study of the Machine Repair Problem.

An attempt was made to develop a heuristic model of the machine repair problem when successive interfailure times followed an arbitrary probability distribution rather than the exponential distribution as is assumed in the classical birth and death analyses of the problem. Basically, the model is motivated by the fact that when burn-in or wear-out phenomena are present, the exponential failure distribution might not provide an accurate description of failure characteristics.

The approach was based upon estimating successive interfailure times of an isolated machine and using a superposition argument to obtain an estimate of the failure rate of the entire process. Unfortunately, monte-carlo simulations of the process indicated that the heuristic gave rather inconsistent performance in estimating the mean and variance of the queue length of units waiting for repair. For this reason, this approach has not been documented in a report.

Steven Nahmias

Steven Nahmias
Associate Professor and
Principal Investigator

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